REMARKS

Pending Claims

Claims 1-14 are pending. Claims 1, 3, 4, and 7 have been amended. The amendment is supported, for example, on page 10, lines 11 and 18. No new matter has been added.

Information Disclosure Statement References of February 17, 2004

"Improvement of Strength of Brazing Joint using Ag as Insert Metal - Development of Brazing Technique for Al-Cu Dissimilar Joint (Part 2)" by Ken KOYAMA, Keiji MIKI, Shizuo MASUMOTO, Atsushi MOCHIDA, Kenji IKEDA, Makoto YOSHIDA and Kenji SHINOZAKI in Keikinzokuyousetsu, Vol 41. (2003) No. 2 ("Reference CC") has the publication date of February 16, 2003.

"Controlling Factor of Al-Cu Dissimilar Brazing Joint Strength Using Ag Insert Metal - Development of Brazing Technique for Al-Cu Dissimilar Joint (Part 3)" by Ken KOYAMA, Keiji MIKI, Shizuo MASUMOTO, Atsushi MOCHIDA, Li DEJUN, Makoto YOSHIDA and Kenji SHINOZAKI in Keikinzokuyousetsu, Vol 41 (2003) No. 9 ("Reference CD") has the publication date of September 16, 2003.

Thus, Reference CD is not prior art to the present application because the foreign priority filing date of August 7, 2003 (and the PCT filing date of August 13, 2003) antedates the publication date.

With respect to Reference CC, disclaiming declarations by the authors of Reference CC, Shizuo Masumoto, Atsushi Mochida, and Kenji Ikeda, are provided herein to obviate Reference CC as potential prior art under 35 USC §102(a).

The inventors of the present application are:

Ken Koyama, Keiji Miki, Makoto Yoshida, and Kenji Shinozaki.

The authors of Reference CC are:

Ken Koyama, Keiji Miki, Shizuo Masumoto, Atsushi Mochida, Kenji Ikeda, Makoto Yoshida, and Kenji Shinozaki.

Therefore, there are three authors – Shizuo Masumoto, Atsushi Mochida, and Kenji Ikeda – who are not listed as inventors of the present application. Disclaiming declarations by these authors attest to the fact that Reference CC is not prior art to the present application under 35 USC §102(a) because the inventive concept in Reference CC belongs to the inventors of the present application.

Claim Rejections – 35 USC §102

Claims 1-3 and 6-9 have been rejected under 35 USC §102(a) as being anticipated by Zhang (US Patent No. 6,521,108). Applicants respectfully submit that presently claimed invention is not disclosed, taught, or suggested by the cited prior art for the following reasons.

Claim 1 recites:

> Claim 1 (currently amended): A brazed bonded structure comprising:
> an Al component;
> a Cu component; and
> Ag as an insert material between the Al component and the Cu component,
> wherein **an Ag layer partly remains in the interlayer between the Al component and the Cu component and partly forms a mesh of Ag_2Al intermetallic compound after brazing and bonding the Al-Cu component.**

At least the above bolded feature of claim 1 is not disclosed, taught, or suggested by the cited prior art. In order to form an Ag layer and a mesh of Ag_2Al intermetallic compound of the present invention, the brazing temperature is set to be 550 deg C +/- 5 deg C. Page 11, lines 17 to 22 in the present specification states the following:

> According to the method for making the present invention, it would be preferable to use a brazing temperature of 823 K +/- 5 K (550 deg C +/- 5 deg C). If the brazing temperature is less than the lower limit of this temperature range, an adequate liquid phase is not created and brazing does not proceed, as described above. If, on the other hand, the brazing temperature exceeds the upper limit of this temperature range, the melting of the Al base material becomes pronounced so that the shape of the structure cannot be maintained.

In contrast, Zhang teaches diffusion bonding of Ag and Al at temperatures 190 to 400 °C (column 3, lines 64 and 65). Thus, it is reasonably assumed that because of Zhang's use of diffusion bonding at those temperatures, Zhang does not disclose, teach, or suggest an Ag layer and a mesh of Ag_2Al intermetallic compound of claim 1.

Therefore, at least for the reason above, claim 1 is not anticipated by Zhang. Claims 3 and 7 have been similarly amended. Therefore, these claims are also not anticipated similarly as claim 1. Dependent claims 2, 6, 8, and 9 are not anticipated at least for the same reasons as their base claims.

Claims 1-4 have been rejected under 35 USC §102(b) as being anticipated by Skinner (US Patent No. 3,119,632). Applicants respectfully submit that the cited claims are not anticipated by Skinner (Skinner I) at least for the following reason.

Claims 1, 3, and 4 have features, an Ag layer and a mesh of Ag_2Al intermetallic compound, which are not disclosed, taught, or suggested by Skinner I. Skinner I seems to imply and the Office Action asserts that the welding is done at the melting temperature of Al (1200 °F or 648 °C) or Ag (1760 °F or 960 °C). Those temperatures far exceed the temperature of 550 °C +/- 5 deg C used to retain an Ag layer and form a mesh of Ag_2Al of claims 1, 3, and 4. Therefore, it is reasonably assumed from the temperatures used in Skinner I that Skinner I also does not disclose, teach, or suggest an Ag layer and a mesh of Ag_2Al intermetallic compound of claims 1, 3, and 4. Claim 2 which depends from claim 1 also is not anticipated at least for the same reason as claim 1.

Claims 1-4 have been rejected under 35 USC §102(b) as being anticipated by Skinner (US Patent No. 3,105,293). Applicants respectfully submit that the cited claims are not anticipated by Skinner (Skinner II) at least for the following reason.

Skinner II seems to imply and the Office Action asserts that the brazing is conducted at a temperature range of 1070-1080 °F (576-582 °C). It is reasonably assumed that Skinner II also does not disclose, teach or suggest an Ag layer and a mesh of Ag_2Al intermetallic compound of claims 1, 3, and 4 because this temperature range is beyond the temperature range that retains the Ag layer and forms the mesh of Ag_2Al intermetallic compound of claims 1, 3, and 4. Claim 2 is also not anticipated at least for the same reason as claim 1.

Claims 1-4 have been rejected under 35 USC §102(b) as being anticipated by Moll (German Offenlengungsschrift 2406828). Applicants further submit that Moll does not anticipate claims 1-4. An English translation of German Offenlengungsschrift 2406828 is provided herein as Exhibit A.

Moll uses friction welding to bond the silver to the aluminum, which is different from the brazing method of the present invention. Furthermore, Moll states:

> ...the intermediate layer of silver or silver alloys has the effect of preventing brittle intermetallic compounds or mixed crystals from forming in the region of the weld. Since copper and silver are one above the other in the first subgroup of the periodic table and are closely related in chemical and physical respects, it is surprising that brittle intermetallic compounds or mixed crystals do not similarly form between silver and aluminum alloys, as is the case between copper and aluminum alloys. If there is an explanation for this effect, it is the small difference between the ionic radii of the copper and of the silver.
>
> (Exhibit A, page 2, lines 10 to 19).

Clearly, Moll does not envision a mesh of Ag_2Al intermetallic compound, let alone a temperature range of forming an intermetallic compound. Because Moll does not mention the features of the claimed invention, Moll does not anticipate claims 1-4.

Claims 1, 3, 7, and 8 have been rejected under 35 USC §102(b) as being anticipated by Bennet (US Patent No. 3,551,998). Applicants submit that Bennet also does not anticipate the cited claims for the following reasons.

In Bennet, the disclosed structure is a sandwich of a copper strip 10, a shim 18 which is a copper-silver alloy, a shim 20 which is silver, and an aluminum strip 14. (See column 3, lines 51-55.) The heat of the joint was said to be raised to 1200 °F and 1400 °F (649 °C and 760 °C) (See column 3, lines 62 and 63). Thus, it is reasonably assumed that because of those temperatures, Bennet does not disclose, teach or suggest retaining an Ag layer and forming a mesh of Ag_2Al intermetallic compound of claims 1, 3, 7, and 8. At least for this reason, Bennet does not anticipate claims 1, 3, 7 and 8.

Claim Rejections – 35 USC §103

Claims 2, 6, and 9 have been rejected under 35 USC §103(a) as being unpatentable over Bennet. For the foregoing reasons, Bennet does not disclose, teach, or suggest an Ag layer and a mesh of Ag_2Al intermetallic compound as set forth in base claims 1, 3, and 7. At least for this reason, dependent claims 2, 6, and 9 are not obvious from Bennet.

Allowed Claims

Claims 10-14 have been allowed. Claim 5 is deemed to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 5 is deemed to be allowable because base claim 4 is believed to allowable for all of the foregoing reasons.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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